UNITED STATES DEPARTMENT OF AGRICULTURE

Rural Electrification Administration

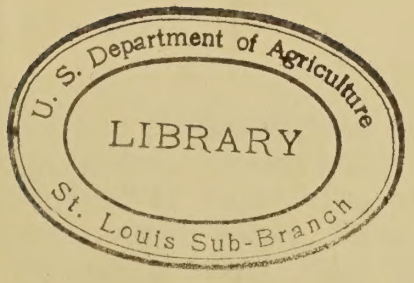
St. Louis 2, Missouri

General Specifications

for

Locker Plant Refrigeration

Construction and Installation



Revised 6-15-45

C-911

GENERAL SPECIFICATIONS FOR LOCKER PLANT DESIGN

Insulation

The Specifications outlined below, using cork as a standard, are for the purpose of guiding the Project in the design and type of installation desired.

Substitutions for cork insulation may be made, provided they meet with the approval of the Design and Construction Division of REA.

In each case, Specifications must be written in detail for each room, setting forth the methods of installation and requirements necessary to insure a neat and thoroughly finished installation.

The design of the various rooms of the Locker Plant shall follow the general procedure as practiced for cold storage plants based on corkboard insulation or its equivalent.

	Outside Wall	Ceiling	Floor
Locker Room (0°F)	8"	8"	6"
Sharp Freezer (-20°F)	9"	9"	7"
Chill Room (34°F)	4"	5"	4"
Aging Room (34°F)	4"	5"	4"
Curing Room (38°F)	4"	4"	4"

Walls between the Sharp Freezer Room and any other refrigerated space, if not below 35°F should have at least 6" of corkboard equivalent insulation.

Where unusual high temperature climatic conditions or exposure are encountered, additional insulation will be specified as each case may require.

Insulation Specifications

The surface to be insulated shall be brushed free of all loose and foreign materials and shall be thoroughly dry. Rough surfaces shall be filled out with a coat of Portland Cement plaster consisting of one part Portland Cement and two and one-half parts clean, sharp sand. When dry, the surface shall be primed with a brush coat of asphalt primer. When the wall height is over

12'-0", a horizontal support shall be bolted to the wall to carry the weight of the insulation above, and imbedded in the first layer of insulation.

Insulation shall consist of (as specified) inches of (corkboard or equivalent) applied in (as specified) layers. Each sheet of insulation shall be dipped, on back surface and all contacting edges, in hot insulating asphalt at a temperature of from 350° to 400°, and immediately pressed firmly into place. Adhesion shall be uniform over the entire area.

The second layer is to be similarly applied to the wall over the first layer, with all joints staggered in relation to each other. The sheets shall be additionally secured to each other by wood skewers and with galvanized nails through caps to treated wood grounds bolted to the wall. In securing the sheets, there shall be not less than two wooden skewers or galvanized nails used per square foot.

All joints must be tightly buttoned and all voids eliminated. Surfaces of the insulation shall be made smooth to receive the finish.

Solid Corkboard Walls

Two layers corkboard - asphalt core. Erect temporary 2" x 4" studs on 18" centers in alignment as a guide for the self-supporting solid corkboard partitions. Erect the first layer of corkboard on edge against the temporary studs. Securely toenail each corkboard to the abutting one, and wherever possible, to the walls, floor and ceiling with special galvanized nails of proper length.

Erect the second layer against the first one in hot asphalt and additionally secure it to the first layer with treated wood skewers of proper length, not less than two per square foot.

Portland Cement Finish

The Portland Cement finish shall be applied approximately 1/2" thick, in two coats, each approximately 1/4" thick. The first coat shall be keyed to the insulation and thoroughly scratched. The second coat shall be brought to a float or trowel finish.

Finish the exposed corkboard surfaces with Portland Cement plaster mixed in the following proportions:

1 part Portland Cement
2 parts clean; screened sand
8% hydrated lime

The second coat shall be blocked off in squares, not over 4'-0", or as may be designated.

Wood Ceilings

Where wood ceilings are installed in refrigerated spaces, all sheathing shall be tongue and groove #1 pine or its equivalent. The sheathing shall be uniform, free from knots or imperfections, thoroughly kiln dried and carefully installed so that there shall be no cracks or openings before applying the vapor seal.

Two layers of vaporproof insulating paper, with edges lapped not less than 3", shall be tacked directly against the underside of the wood ceiling. The first layer of corkboard shall be applied in hot asphalt and secured to the wood ceiling with special galvanized nails, not less than three to the square foot. The second layer shall be applied in hot asphalt and secured by means of wood skewers of proper length, not less than three to the square foot. The exposed corkboard surfaces shall be finished with Portland Cement plaster or an asphalt emulsion mixed in the proportions of:

50 gallons of asphalt emulsion
115 pounds asbestos floats
275 pounds (2-3/4 cu. ft.) dry, screened sand
15 gallons of clean water

The ingredients shall be mixed together until uniform in color throughout. A minimum quantity of water should be used, necessary to give the proper troweling consistency.

The mixture then shall be applied directly to the corkboard surface in two coats of approximately 1/8" thickness. Before applying the first coat, care must be exercised to point up all voids with the mixture. The first coat must be hand dry before the second coat is applied. The second coat shall be troweled smooth, with corners true and clean. Moisture-resistant, odorless paint shall not be applied to the finish until it is thoroughly dry.

Concrete Slab Roof

Two layers of corkboard, both layers in asphalt, beveled wood strips in concrete. There shall be placed in the concrete forms on 12" or otherwise specified centers, beveled wood inserts. After the concrete has set and seasoned and the forms have been removed, the surface to receive the insulation shall be thoroughly cleaned of dirt and loose mortar. The concrete surface shall be primed with asphaltic priming paint. The surface must be thoroughly dry before the priming paint is applied. This paint shall be allowed to dry before the erection of the insulation in hot asphalt. Apply the first layer of corkboard in hot asphalt and secure it to the beveled wood inserts with special galvanized nails. Apply the second layer in hot asphalt, additionally securing it to the first layer of corkboard with treated wood skewers of proper length, not less than three per square foot.

Wood Columns

Two layers of corkboard, both layers applied in hot asphalt. Apply the first layer in hot asphalt and additionally secure with galvanized nails of proper length, two per square foot. Apply the second layer in hot asphalt and additionally secure it with treated wood skewers to the first layer, not less than two per square foot.

Steel Columns

The steel column shall be clean of all dirt or rust where the insulation is to be applied. The first layer of corkboard shall be applied against the steel column in waterproof cement and propped in place until the cement has set. The second layer shall be applied in hot asphalt and additionally secured to the first layer of corkboard with treated wood skewers of proper length not less than two per square foot.

All vertical corners shall be protected with suitable angle corner guards not less than 6'-0" high, securely fastened to the corner before the finish is applied.

For Unexcavated Floor Area

In case the floor should be in an unexcavated area, a 12" or 18" cinder or sand fill shall be placed, confined to the building wall foundations, and well drained. This shall be well tamped, followed by a concrete base of not less than 3 inches. The concrete floor shall be brushed free of all loose and foreign materials.

The first layer of corkboard shall be dipped in hot asphalt and applied directly against the concrete sub-floor. The second layer of insulation shall also be dipped in hot asphalt and immediately pressed into the first layer, breaking all joints. The entire surface is then to be hot mopped and flooded with asphalt of not less than 60 pounds per 100 square feet. The insulation to be installed must meet local requirements and be specified by those in charge. A concrete and grit wearing floor shall then be poured, of not less than 3" of concrete, reinforced with 6" X 6" of 12 gauge wire mesh. The final coat shall be float finished and smooth, providing easy drainage when such is specified in the building plans or by the Engineer in charge.

The Insulation Contractor shall install the corkboard insulation in a neat and workmanlike manner. All walls shall be true, straight and without waves. No corkboard shall be used that is cracked, poorly formed or has broken corners. Where unsatisfactory work of this nature is found, a new installation with new materials will be necessary.

NOTE: IT MUST BE REALIZED IN LOCKER ROOM COLD STORAGE PLANTS THERE IS NO POSSIBILITY OF EVER SHUTTING OFF THE REFRIGERANT TO ALLOW REPAIRS TO BE MADE TO THE INSULATION. FAILURES DUE TO MOISTURE FREEZING THRU, AND OTHER FAULTS OF IMPROPER APPLICATION OF INSULATION WHICH CANNOT BE CORRECTED, DEMAND THAT ONLY THOSE THOROUGHLY EXPERIENCED IN THIS WORK SHOULD ATTEMPT THE INSTALLATION OF THE INSULATION.

Cold Storage Doors

Cold storage doors for the Chill Room, Aging Room and Curing Room shall be of the track door type with not less than 4" of corkboard or equivalent insulation. Where this type of door does not apply, a standard type of cooler door, with 4" insulation, shall be used as specified. The Locker Room door, opening into the lobby, shall be of the cold storage or super freezer overlap door type, not less than 3'-0" X 6'-6", with a door closer and with fastener easy to operate. The thickness of the insulation of the Locker Room door shall be of the same thickness of insulation as that of the wall in which the door is installed. The Locker Storage Room shall be provided with a vestibule and vestibule door at the patrons' entrance. Vestibule doors shall be of the freezer type, insulated with 2" of corkboard of equivalent insulation, with gaskets and hardware as specified, and with a "Thermo Pane" peephole or its equivalent. The Quick Freeze room door (2'-6" X 6'-6") shall be of the cold storage or super freezer overlap type with not less than 6" of corkboard insulation where freezing temperatures are maintained within the refrigerated space or where temperature differentials are above normal. In the application of a freezer cabinet, the service door shall be of the super freezer (2'-0" X 2'-6") overlap type.

Hardware and gaskets shall conform to specifications given. Care shall be exercised to install substantial sills of beveled wood securely fastened to the floor, or to install concrete sill cast after finished floor is in place. Concrete sills shall be cast from the top of the insulation. The top of all sills shall be no less than 3/4" above the finished floor proper. All hardware shall be of the best grade steel, cast bronze or forged brass, with hinges designed for heavy duty and rough usage, with rustproof or plated finish. The locks shall be of the heavy duty type, adjustable roller strike with an inside releasing rod. They shall be easy to operate and shall be arranged for locks where specified. All gaskets shall be of rubber or high grade rubber composition, designed to provide perfect seal between the door and the door frame.

There shall be installed between the chill and aging room, a double swinging batten door similar to Stevenson's "Auto Close" door as manufactured by the Jamison Cold Storage Door Company.

Pipe Insulation and Covering

Cork covering shall be considered as standard. However, substitutions for cork will be acceptable, provided they meet with the approval of the Design and Construction Division of REA.

The cork covering and fitting covers, or their equivalent, shall be installed according to the following schedule:

-25° to 0°F ---- Special thick brine, thickness 2.63" to 4.0"

-0 to 35°F --- Brine thickness 1.70" to 3.0"

Above 35° ------ Ice water thickness, 1.20" to 1.39"

All refrigeration lines shall be tested, free from plaster, rust and moisture before applying insulation.

Sectional covering shall be applied with the end joints broken by starting with one-half and one full length piece, and longitudinal joints shall be on top and bottom of pipe. Waterproof cement shall be used on all joints with wire and bands in place. At least six copper clad wires or 1/2" galvanized bands shall be placed per 36" section. All fitting cover joints shall be cemented with not less than four copper clad wires or galvanized bands on screwed fittings and not less than six wires or bands on flanged fittings. All spaces between fittings shall be filled with an adequate filler.

Where cork lagging is to be applied instead of sectional covering or fitting covers, apply lagging with end joints broken by starting with alternate 18 and 36 inch lengths. Waterproof cement shall be used on all joints and secured with copper clad wires or galvanized bands spaced not less than 6 inches apart. Where refrigeration piping passes thru insulated walls into a refrigerated room, the covering shall extend into the room not less than one inch beyond the wall, and care shall be exercised to see that the joints between the wall and insulated pipe are filled and perfectly tight. Wall and floor openings must be large enough to allow for full thickness of covering.

On low pressure systems where Freon or Methyl Chloride are employed, pipe covering is not necessary.

Condensing Unit

(Freon)

The specifications for the locker plants require the following performance guarantee:

> The contractor guarantees, for a period of one year after acceptance by the cooperative and REA, that the design and construction of the building and equipment shall be such as to maintain, under normal operating conditions, the temperatures as specified under room temperatures, with maximum design ambient temperature of that locality, and with the compressor operating not in excess of 16 hours per day.

The compressor units shall be of the reciprocating, centrifugal, radial or rotary type, rigid in construction, of furnace nickel iron or semi-steel cylinders, honed to precise finish, finned surfaced, or water cooled jacket

at head, for the removal of compression heat with adequate gas ports. The crankcase shall be of high grade iron with a sight glass for checking oil level. Suction and discharge valves shall be of high grade Swedish steel, quiet in operation and positive acting. The pistons shall be of high grade iron, accurately finished and carefully matched with compression oil rings and oil groove. Connecting rods shall be of forged steel or high grade iron with large babbited crank bearings, bronze piston pin bearings, diamond bored to a mirror finish. The crankshaft shall be of open hearth or forged steel, all bearing surfaces hardened and ground, seal shoulder ground to provide a perfect sealing surface. Main bearings shall be of the bronze or die cast type, properly finished for perfect alignment. The lubricating system shall be of the pressure or splash type, so designed that all moving parts of the unit will be adequately oiled. The main bearings should be submerged in oil. The drive shall be of multiple V-belt, built up of rubber, cord and fabric. Compressor and motor pulleys shall be specially grooved for endless belts. Belt guards shall be supplied of sheet steel and extended in such a manner as to shield belts and pulleys. A liquid receiver shall be provided, of adequate size, of welded seamless steel heads, mounted in the base under the compressor and motor, and equipped with a fusible safety plug. The condenser shall be of the radiator type of finned tubing. A metal shroud around the condenser shall be installed in such a manner as to direct the flow of the air drawn thru the condenser by fans. In case the condensing unit is of the water cooled type, a liquid receiver shall be furnished of adequate size, with a liquid level indicator. A suction line strainer screen shall be provided in the suction manifold. A mercury type or similar control, with combined high pressure cutout and low pressure control switch, with magnetic, across-the-line or reduced voltage starter as specified, together with a complete charge of refrigerant sealed in the receiver, shall be furnished as a part of the condensing unit assembly. In addition to the above equipment, an oil separator of proper size shall be installed in the hot gas line between the compressor and receiver. The condensing unit shall conform in every respect to the standards as set forth by the American Society of Refrigeration Engineers and the American Standards Association. The condensing units shall be located as near the refrigerated rooms as possible, having proper ventilation so that they may be reasonably free from dust and rubbish. The condensing unit shall be placed on a concrete foundation, designed particularly to fit the condensing units to be installed. The foundation shall be level and true in all respects, free from settlement and vibration while condensing units are in operation at maximum speed. Where steel foundations for the compressor are provided by the manufacturer as an integral part of the condensing unit assembly, care shall be exercised in securing a level and firm foundation when making the installation.

The refrigeration system shall be subjected to a vacuum test prior to charging with refrigerant. The compressor shall be operated until there is at least 26 inches of vacuum gauge on the entire refrigeration system. After a period of one hour, if there is no loss on the system, 5 pounds of refrigerant pressure (F12-F22) shall then be induced on the system. The entire system shall then be checked for leaks. If no leaks are found at this pressure, then impose 50 pounds on entire system and test for leaks. If no leaks are found, then charge condensing units with proper charge of refrigerant and proceed to refrigerate rooms to specified temperatures. After two days of operation, the refrigeration system will be shut down and the

temperature of the refrigerated rooms allowed to stabilize at the average plant temperature. The system will then be checked again for leaks. One year's supply of refrigerant shall be furnished by the contractor.

Evaporators

(Freon)

Evaporators shall be plates, coils (other than bare pipe) or forced air circulation coolers and shall have a cooling capacity not less than that as specified for the space to be cooled. The refrigerating capacity of the locker room and freezer room, or cabinet, evaporators shall be based on not more than 10°F temperature differential. Should forced air evaporators be employed, the velocity of the air shall not be excessive, causing discomfort to the patrons entering the locker room. Design shall be based on not less than two pounds of product per locker to be frozen daily in the freezer room or cabinet.

For temperatures between 20° and 40° F there shall be not more than 4 fins per inch on forced air evaporators. For temperatures lower than 20°F, no more than 3 fins per inch shall be used. The evaporators shall be provided with a non-corrosive metal drip pan of sufficient size to collect water from defrosting coils and condensate from expansion valves. Sufficient drains shall be provided from the drip pans to the floor of not less than 5/8" OD copper tubing. A drier coil, external heat exchanger or combination accumulator and heat interchanger of sufficient size shall be included to prevent suction line sweating. A fan and motor capable of continuous operation shall be provided and shall be quiet and free from vibration under all conditions of operation. The motor shall be of drip or splashproof design and a vaporproof switch shall be installed at a convenient location.

Room temperatures shall be controlled by a thermostat or air switch of the proper range and differential for each refrigerated room. A solenoid valve shall be located in the liquid line at each evaporator, or series of evaporators, that is to refrigerate the room. The solenoid valve and thermostat, or air switch, shall be connected so that when the contacts of the thermostat are closed, the solenoid valve will be energized and allow the refrigerant to flow to the evaporator. When this circuit is open, the flow of refrigerant to the evaporator will be stopped.

Expansion Valves

An adjustable thermostatic expansion valve shall be installed in the refrigerant supply line to each cooling surface. Each thermostatic expansion valve shall be of the diaphram or bellows type with externally protected superheat adjustment and shall be designed for ten (10) degrees F superheat. The thermostatic bulb shall be attached to the coil between the active refrigerating surface and the heat exchanger.

Shut-off service valves shall be installed at each evaporator, in both the liquid and suction lines, so that the individual evaporator or its parts may be serviced or isolated without disrupting operation of the system.

Condensing Unit

(Ammonia)

The condensing unit shall consist of semi-steel cylinders, cast separately or in conjunction with the crankcase, insuring strength and wearing qualities. Cylinders may be cast with or without jacket. Housing and bearings shall be drilled in such a manner as to insure perfect alignment. The crankcase shall be provided with a hand hole for cleaning and adjusting the bearings. An oil gauge shall be provided, giving ready indication of the oil level in the crankcase. Discharge valves may be of the poppet type, located above the piston in a safety head protecting the machine against excessive pressures. The valves shall be high tensil steel, carefully balanced, insuring rapid opening and closing. Connecting rods shall be of malleable iron with removable wrist pin bearings, also removable die cast babbit crankpin bearings provided with shim adjustment. Lubrication shall be of the splash or force feed type.

The crankshaft shall be fabricated from the best quality open hearth steel, die forged, turned and ground to gauge. Provisions shall be made for splash or forced feed lubrication. Stuffing boxes shall have ample depth with oil gland that can be automatically lubricated from the crankcase. Lubrication shall be of the forced feed or splash type, guaranteed to provide adequate lubrication to all moving parts. The drive shall be of the V-belt type with the compressor and motor pulleys grooved for multiple endless belts built up of rubber, cord and fabric, insuring quiet operation and minimum slip and friction loss. The condenser shall be of the shell and tube type, with ample surface of welded construction with tube head welded to the shell; seamless steel tubes shall be provided, expanded into the tube heads. A condensing water regulating valve, high pressure cutout, refrigeration control valve, thermostat, high and low pressure gauges, suction strainer and shut-off valve, as well as a scale trap in the liquor line, shall be supplied as an integral part of the condensing unit assembly.

In the case of self contained units, care shall be exercised to provide additional receiver capacity where the occasion shall justify.

The condensing unit shall conform in every respect to the standards as set forth by the American Society of Refrigeration Engineers, and the American Standards Association.

Receiver

In case a self contained condensing unit is not applicable, a steel receiver, of ample capacity to hold 20 percent more refrigerant than the normal operating

charge, shall be furnished. It shall be completely equipped with inlet and outlet valves, sight glass and guard, charging valve, purging valve and relief valve, and shall be mounted in an appropriate location on substantial hangers or saddles. Refrigerant shall be pumped into receiver at completion of work to assure that the proper receiver size is provided. Special precaution shall be taken to pipe the safety valve to a point not less than three feet above the plant roof. The end of the pipe shall be provided with a tee.

Ammonia Evaporators

Evaporators shall consist of plate coils, steel pipe coils or forced air circulation coolers and shall have a cooling capacity not less than that as specified for the room to be cooled. Ammonia coils shall be of full weight black pipe, appropriately designed to conform to the space provided by the architect in the rooms to be refrigerated.

All joints shall be welded, as well as the flanges providing connections to refrigerant lines. Sufficient room shall be provided for thermostatic expansion valves, allowing adequate room for easy service.

Coils shall be supported from the ceiling by 3/4" wrought iron bolts, galvanized with the bearing surfaces insulated against heat loss, and properly fastened to ceiling joists at appropriate locations which shall be specified.

Ammonia forced air cooling units shall be employed as specified in the Aging, Chilling and other rooms maintaining a temperature of 35^{0}F or more. Refer to design and number of fins per inch as specified under Freon evaporators which applies equally to forced air ammonia evaporators.

Evaporative Condensers

(Freon - Ammonia)

General: The evaporative condenser shall be designed to suit the refrigerant used and shall have a capacity not less than that shown on drawings.

Construction: The condenser unit shall be of weatherproof construction, with casing constructed of not lighter than 18 gauge steel, properly reinforced. The casing shall be provided with doors of suitable size for convenient access to all parts of the condenser. Steel used in the fabrication of the casing, drip pan, fan scrolls and wheels shall be treated to resist corrosion by bonderizing, galvanizing, parkerizing or galvannealing. The condenser shall be erected on a suitable raised concrete foundation, unless otherwise shown.

Motors shall be quiet in operation and designed to suit the current characteristics as specified.

Fans shall be quiet in operation and be provided with scrolls and wheels of heavy gauge metal.

Spray nozzles shall be of the non-clogging type, installed so as to permit ease in dismantling. The unit shall be designed to operate with "sprays on" during the warm weather and with "sprays off" during the cold weather.

The water pump shall be of non-overloading centrifugal or turbine type with suitable approved bearings, and shall be motor driven, connected to the drip pan and sprays.

The water eliminators shall be constructed of a suitable metal not less than 16 gauge.

Condenser coils shall be of the plain tube or extended fin steel tube type, completely welded and galv ized after assembly. For Freon application, it is preferred that copper coils be used for condensing purposes. Water make-up assembly shall include a shut-off valve, float valve and other necessary appurtenances as required to properly control the water supply to the condenser drip pan.

Condenser controls shall be automatic and shall be designed to start the evaporative condenser when the first condensing unit goes on the line and to stop when the last condensing unit is off the line.

Magnetic starter shall be designed with an integral selector switch for automatic cut-off and for manual operation.

Should the unit be located within the machine room, the exhaust air shall be removed to the outside of the building by means of sheet metal ducts. Drip pan shall be constructed of not lighter than 20 gauge steel and shall be complete with overflow drain and water make-up connections. In case the evaporative condenser is located in the open, it shall be painted with corrosion resistant lacquer and water lines shall be covered where necessary to prevent freezing.

Where a cooling tower is employed, the tower shall be constructed so that the base of the drip pan is at least twelve inches above the foundation proper. In case the cooling tower is used in conjunction with a shell and tube condenser, the piping arrangement shall be such that the refrigeration system can be operated during freezing weather or pump failure without the use of the cooling tower. When operating under these conditions, all waste water from condensers shall be piped directly to the sewer. The water supply shall be of adequate capacity for operation with water pressure regulating valves.

Electrical Service

The distribution transformers shall be located not less than 100' from the load center to the locker plant. The service shall be three phase, four wire (where possible) providing 120/240 volts to the various machines. The service wires shall be triple braid weatherproof and of such a size that the

voltage drop at full load shall not exceed 2 percent. All motor connections and installations of equipment wiring must conform to the provisions of the 1940 National Electric Code applying to this class of service and to all local codes. Electric motors shall conform to the standards as set forth by the National Electric Manufacturers' Association. Three phase condensing unit motors shall be of the high torque, low starting current type, (Class II), where the electrical characteristics will permit. Motors shall be properly fused and independent of the lighting system. All motors larger than 5 H.P., if they are of the standard squirrel cage type (normal torque, normal starting current), shall be provided with reduced voltage starting equipment, preferably of the autotransformer type, similar to General Electric's CR-1034-K1 with overload and low voltage protection, including push button reset.

Conduit of sufficient size shall be provided over all refrigerated rooms, with openings, as shall be specified by the architect. Fibre conduit with 1/4" wall thickness shall be used at all points where an electric service is extended thru an insulated wall. All openings shall be carefully caulked and plugged with a compound that will not solidify at low temperatures. In case equipment electrically driven should be exposed to the weather, splashproof motors shall be provided with adequate remote control, or automatically controlled from the condensing unit control equipment, as the case may justify. A double service outlet shall be provided at the panel board of the compressors. Pilot type switches shall be employed for all refrigerated rooms as well as vapor proof light fixtures and fittings.

Refrigeration Piping

Refrigeration piping, from the condensing unit to the evaporators, shall be installed in as nearly a straight line as is possible. The piping shall be located in such a manner as to be safe from injury or disturbance by the general business of the plant. The piping shall be free from excessive turns, restrictions, buckles, creases, kinks or wrinkles, and shall conform to ASHVE standards as well as the standards of the American Society of Testing Materials. In the case of annealed or copper tubing, as well as ammonia piping, the size of the pipe shall be determined according to ASHVE standards, taking into account pressure drop and other factors for the purpose of arriving at the proper size. For short lengths of copper tubing, the following table may be applicable:

Suction Line	Liquid Line	H.P. Rating of Comp. Motor
1-1/8"	3/8"	3
1-3/8"	1/2"	5
1-5/8"	1/2"	7/5
2-1/8"	5/8"	10

All joints of annealed copper tubing, not exceeding 5/8" in outside diameter, may be made with flared compression fitting of approved type, provided that such fittings shall be exposed for visual inspection. Joints in pipe or tubing erected on the premises shall remain intact when subjected to a pull-apart test equivalent to a pressure of not less than 300 pounds per square inch gauge pressure with a temperature of not less than 250°F.

All sweat fittings, and that part of the pipe or tubing that is inserted into the fitting, shall be polished with steel wool No. 00 or cloth sandpaper, assuring a perfect joint when applying solder. Liquid or paste soldering flux shall be used. Hard solder of 95-5 shall be used and applied so as to have a neat and secure joint without voids and excessive beads of solder at the base of the pipe on a vertical joint, or strings of solder along the pipe on a horizontal joint. The pipe or tubing shall be fastened securely to the ceiling or walls by the use of copper or other non-corrosive metal pipe straps or hangers. In no case shall pipe or tubing be installed in such a manner that it shall be crossed or rest against another pipe. Where refrigeration pipes or tubing are passed thru insulated walls, the pipe shall be caulked to prevent moisture from entering the insulation. Refrigerant lines passing thru floors and concrete walls, as well as cinder foundations and cinder block walls, shall be encased in seamless conduit pipe, the end of which shall then be caulked with asphalt to prevent condensation in the conduit.

In the case of ammonia piping, all joints shall be welded in a clean and workmanlike manner, conforming to the welding section of the American Standards Association Code for pressure piping. All water piping and connections to pumps, cooling towers and evaporative condensers shall be galvanized seamless pipe and shall be covered as specified. Seamless copper tubing shall be used only with Freon (12-22) or Methyl Chloride.

Lockers

Lockers shall be selected by the cooperative and approved by the Design and Construction Division. They shall be carefully chosen to occupy the space allotted for them. The lockers shall be not more than six tiers high, with aisles not less than 32" wide. The lockers shall be formed of pressed steel, with baked enamel finish. The lockers shall be numbered consecutively on rust resisting plates of such size as to be easily located and read. Drawers shall be designed in such a manner that they may be easily operated. The locker doors shall have a neat and attractive appearance with rust resistant tamper-proof hinges. All drawer and door units shall be equipped with master key locks.

It is suggested that, where possible, locker sizes shall conform to the following standard dimensions, and in all cases the depth of the lockers shall be uniform:

Locker Sizes

15" X 20" X 30"	150 lbs. capacity	
16" X 18" X 30"	185 lbs. capacity	
17" X 20" X 30"	200 lbs. capacity	(Door type)
20" X 30" X 16"	200 lbs. capacity	
18" X 20" X 30"	215 lbs. capacity	
16" X 24" X 30"	250 lbs. capacity	(Drawer type)
20" X 20" X 30"	250 lbs. capacity	(Drawer type)
15" X 24" X 30"	250 lbs. capacity	(Door type)

The 16" X 24" X 30" size drawer type and 15" X 24" X 30" door type shall be used with four drawers and two doors to a tier.

Overhead Tracking

The refrigeration contractor shall provide and install, where specified, overhead track, track hangers, track switches, switch stops, track rollers and roller hooks, all of which shall be designed to withstand abuse and moisture condensation. Track hangers shall be of such design as to facilitate the installation of the track. All track hangers shall be bolted to supporting members. The track shall be of good grade steel, painted or rust-proofed, neatly finished. Switches shall be of the best grade cast iron with proper provisions for fastening to the rails. Switch stops shall be provided and installed at appropriate points for easy and safe operation of the assembly. Track rollers shall be true and smooth grooved, designed in such a manner that they will not climb on curves or switches, or wear flat. Cold pressed axle pins or rollers shall be hard, with smooth surfaces, easily oiled, providing smooth operation. The track shall be not less than 8'-2" from Locker Plant floor to the bottom of the rail. Where tracks pass thru cold storage doors, care shall be exercised to see that there shall be no binding or difficulty in properly opening or closing the doors. Track scales shall be provided where specified of not less than 1500 pounds' capacity.

Processing Equipment

The owner reserves the right to purchase all or a part of the processing equipment. However, when the processing equipment is included as part of the refrigeration contract, the Refrigeration Contractor shall submit with his bid a complete list of all processing equipment, including the manufacturer's name, number of pieces and catalog numbers. The equipment shall have a manufacturer's guarantee of the product's quality, providing for immediate replacement in case of flaw, defect or unsatisfactory operation.

One 30" X 30" Monarch, or its equivalent, meat block
One 30" X 72" X 3" Master, or its equivalent, meat cutting table
One Electric meat saw, Biro Model BB, or its equivalent
One Meat Chopper, Enterprise, Model 1541, or its equivalent (may be purchased with sausage stuffing attachments)
One Sausage stuffer, Wagner No. 2, or its equivalent

One Gas-fired steam jacket lard rendering kettle, complete with automatic controls. Koch No. 150 or No. 175 (50 or 75 gallons) or its equivalent.
One Hand-operated lard press, 17" diameter. Salem Tool Company, or its equivalent.
One Lard skimmer.
One Lard stirrer.
One Lard filterer.

Two Lard spades (aluminum)
One Butcher saw 26"
One Splitting saw 30"
One Blanching unit (steam)
One Counter computing scale, 30 lbs. x 1 oz. Sanitary or its equivalent

One Portable platform scale capacity 500 lbs.
50 Bacon hooks, 8 prong
One Block scraper, 4" x 6" hardwood flat handle, Chatillon, or its equivalent
One Block brush, 9" x 4", Osborn, or its equivalent
One Heavy duty broom, Osborn, or its equivalent

One Metal floor squeegee, 16"
One Length hose with couplings 50' length
Six Frocks or beef luggers
Six Waterproof aprons 50" x 40"
Two Twine cone hangers

Two Paper racks pyramid type, 24" and 18"
One Cellophane roll holder
One Sealing tape machine
Six 18-1/8" x 12-1/2" x 2-1/4" sausage pans (aluminum)
36 Freezer baskets, 17" x 28"

One Carborundum stone (8" x 2" x 1")
One Skinning knife, 6")
Two Steak knives, 10")
Two Boning knives, 6")
Six Stainless steel paring knives) To be Russell-Harrington, or its equivalent
One Meat cleaver, 9")
One Lamb splitter, 12")
One Steel, 10")
One Steel, 14")

There shall be installed in the slaughtering house, where specified, the following equipment:

One Scalding vat, 72" x 30" x 30" complete with throwout arms and gas burner with automatic controls
One 2000 lb. capacity chain hoist (motor driven) Budgit Frame K or its equivalent
One Hog scraping table, 72" x 48"
One Hog wash valve with 10' hose
One Steel beef spreader

24 Fore-quarter galvanized beef trolley hooks
24 Hind-quarter galvanized beef trolley hooks
24 Hog galvanized trolley hooks, 4" wheel, 5" gambrel
12 Hickory hog gambrels, 22" long
12 Hickory hog gambrels, 25" long

If a chicken picker is desired, it shall be similar to Pickwick, Model D.

The hot water tank and pressure tank, together with the deep or shallow well pump, shall be included in the plumbing contract.

The form C-100, Analysis of Locker Plant Refrigeration Heat Loads, shall be filled in by the Refrigeration Contractor, with a one line diagram of the piping and wiring of the refrigeration system, and submitted to REA for approval, prior to the installation of the refrigeration equipment.

REA reserves the right to check the heat load analysis, making additions or deletions where necessary to meet standard requirements.